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| APPLICATION NO.   | FILING DATE | FIRST NAMED INVENTOR       | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------------|---------------------|------------------|
| 09/668,199  | 09/22/2000  | NAOFAL AL-DHAHIR           | AL-DHAHIR 2         | 9867             |
| 7590 06/28/2005   |             |                            |                     |                  |
| HENRY T BRENDZEL<br>P.O. BOX 574<br>SPRINGFIELD, NJ 07081 |             | EXAMINER<br>WARE, CICELY Q |                     |                  |
|   |             | ART UNIT<br>2634           |                     | PAPER NUMBER     |
| DATE MAILED: 06/28/2005                                   |             |                            |                     |                  |

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/668,199

Applicant(s)

AL-DHAHIR, NAOFAL

Examiner

Cicely Ware

Art Unit

2634

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 24 March 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 2-4, 6 and 12-18 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 2-4 and 6 is/are rejected.
- 7) ☒ Claim(s) 12-18 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 3/24/2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 2-4 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bottomley (US Patent 5,499,272).

(1) With regard to claim 2, Bottomley discloses in (Fig. 1) a receiver operating in an environment where a transmission channel (col. 1, lines 11-18),  $H$ , between a transmitter of information and said receiver has a memory corresponding to  $n$  transmitted symbols, said receiver being responsive to an  $n_0$  plurality of receiving antennas (col. 1, lines 19-41); a pre-filter (Fig. 3, (301)) having an  $n_0 \times n_i$  plurality of FIR filters,  $F(j,k)$ , where  $n_i$  is a number of transmitting antennas whose signals a said receiver is processing  $j$  is an index running from 1 to  $n_0$  and  $k$  is an index running from 1 to  $n_i$ , each filter being responsive to a signal that is derived from receiving antenna  $j$  (Fig. 1 (100, 101), Fig. 3 (301)), and applying its output signal to a pre-filter output point  $k$  and decision logic responsive to said pre-filter output points; and a sampling circuit (col. 5, lines 38-45) interposed between the plurality of antennas and the pre-filter (Fig. 1 (100), Fig. 3 (301), Fig. 5).

However Bottomley does not disclose a sampling circuit that samples received signal at rate  $T_s = T/l$ , where  $l$  is an integer that is greater than 1, and  $T$  is symbol rate of a transmitter whose signals the receiver receives.

However it is the understanding of the examiner by reviewing the specification (Pg. 3, lines 8-11) that the sampling by a rate of  $T=T/l$  is simply oversampling. Oversampling is the well-known process of sampling a signal with a sampling frequency higher than the nyquist frequency. Since it is known that a sampling speed or frequency can be chosen depending on the design specifications of the device, it would have been obvious to one of ordinary skill in the art that the device of Bottomley (Fig. 5) could have been designed to sample the signal with a sampling frequency higher than the nyquist frequency. Oversampling generates more samples from a waveform, which increases the accuracy of signal reconstruction. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to implement oversampling in the device of Bottomley because oversampling aids in anti-aliasing and is a low-cost solution to achieving high-resolution analog-to-digital conversion.

(2) With regard to claim 3, claim 3 inherits all the limitations of claim 1. Bottomley further discloses a preprocessor for computing coefficients of said FIR filters that result in an effective transmission channel memory between said transmitter and output of said pre-filter of transmitted symbols that is less than  $n$  (col. 10, lines 22-52).

(3) With regard to claim 4, claim 4 inherits all the limitations of claim 2. Bottomley further discloses a preprocessor for computing coefficients of said FIR filters in

response to a block of symbols that is received by said receiver, and installing the computed coefficients in said FIR filters (col. 9, lines 22-24, col. 10, lines 22-52).

(4) With regard to claim 6, claim 6 inherits all the limitations of claim 4. Bottomley further discloses said coefficients of said FIR filters are computed and installed every time said transmission channel, exhibits a significant change (col. 10, lines 22-38, 41-52).

***Allowable Subject Matter***

3. Claims 12-18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The following is a statement of reasons for the indication of allowable subject matter: The instant application discloses a receiver operating in an environment a receiver operating in an environment where a transmission channel between a transmitter of information and a receiver has a memory corresponding to  $n$  transmitted symbols, the receiver being responsive to a plurality of receiving antennas. Prior art references show similar methods but fail to teach:

**“plurality of FIR filters is expressed by matrix  $W$ ”, as in claim 12; “plurality of FIR filters are subjected to designer constraints relative to any one or a number of members of the following set: transmission channel memory, size of said block, effective memory of the combination consisting of said transmission channel and said pre-filter; autocorrelation matrix  $R_{xx}$ , autocorrelation matrix  $R_{nn}$ , value of factor  $l$  in said sampling circuit, and decision delay”, as in claim 13; “matrix  $W$ ”, as in claim 14; “constraints restricts  $B$ ”, as in claim 15, 16, 17, and 18.**

***Conclusion***

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Cicely Ware whose telephone number is 703-305-8326.


The examiner can normally be reached on Monday – Friday, 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin can be reached on 703-305-4714. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9314 for regular communications and 703-872-9314 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.

***Cicely Ware***

cqw  
June 23, 2005

  
**STEPHEN CHIN**  
**SUPERVISORY PATENT EXAMINE**  
**TECHNOLOGY CENTER 2800**